Empirical Evidence of H-O International trade theory

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Leontief Paradox

- In 1953, Leontief calculated the capital intensity of export and import of the US.
- Note that in 1953, the US was the most capital abundant country in the world.

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Factor content of US Export and Import in 1962

	Import	Export Factor content of US Export and Import in 1962
Capital per million dollars	$2,132, 000	$1,876, 000
Labor per million dollar	119	131
Capital labor ratio	$17,916	$14,321
Average year of education	9.9	10.1
Proportion of engineers and scientists	0.0189	0.0255

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Testing H-O model in more countries

Factor of Production	Predictive Success
Capital	0.52
Labor	0.67
Professional workers	0.78
Managerial workers	0.22
Clerical workers	0.59
Sales workers	0.67

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Continued

Factor of Production	Predictive service
Service workers	0.67
Agricultural workers	0.63
Arable land	0.7
Forest	0.7

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Trade between China and Big 3 advanced countries

Type of Product	Chinese Export to Big 3	Chinese import from Big 3
Chemicals	8.57	20.08
Nonelectrical machinery	9.00	31.81
Clothing	25.36	0.32
Other consumer goods	46.80	14.58

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North and South Trade

- Looking at changes in patterns of exports between developed (high income) and developing (low/middle income) countries supports the theory.
- US imports from Bangladesh are highest in low-skill-intensity industries, while US imports from Germany are highest in high-skill-intensity industries.

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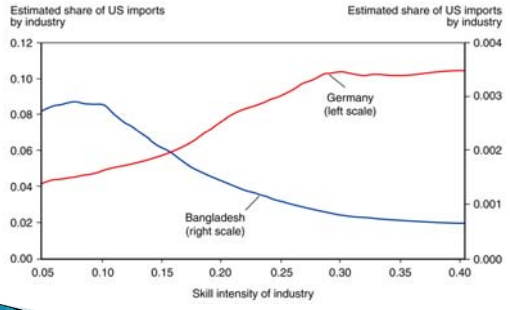
North and South Trade



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US trade with Asia

- As Japan and the four Asian "miracle" countries became more skill-abundant, U.S. imports from these countries shifted from less skill-intensive industries toward more skill-intensive industries

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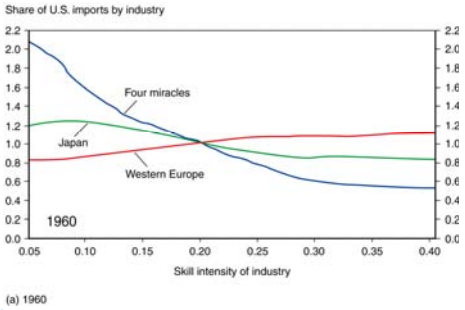
1960



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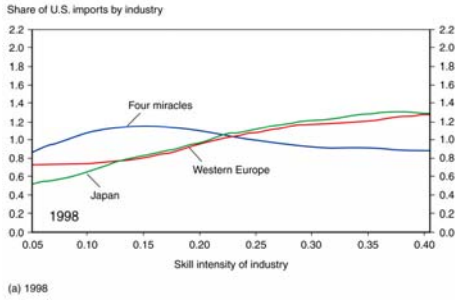
1998



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Test on Stolper-Samuelson looking at congressional vote in the US

- Several authors looked at the US congressional vote on trade policy.(GATT and NAFTA)
- They considered two types of factors as the most important production factors:skilled labor and unskilled labor
- They calculated relative size of skilled and unskilled workers in each election district.
- They assumed that the representative from each district will follow the opinion of the majority in their own election district

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Baldwin's Study(1985)

- He look at the tariff cut of US in the Tokyo round of GATT negotiations.
- The dependent variable is the voting of tariff cut from the representative in each district.
- Main explanatory variable is the ratio of unskilled labor/total labor.

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Baldwin's Study(1985)

- The main prediction is the ratio of unskilled workers/total workers in each district.
- If this ratio is large in a district, then a representative from this district should vote again the tariff reduction.
- He found that the data is consistent with the theory.

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Irwin's Study(1994)

- Irwin studied a rare case of direct democratic voting on trade policy-the British general election of 1906.
- Why Britain ? Why 1906 ?

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Introduction

- In the mid-nineteenth century, Britain's free trade policy was threatened by protectionist pressures.
- This comes from increasing German and American competition in traditional British export markets and even import penetration in its domestic market.

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Introduction(2)

- Free trade was challenged by a "fair trade" movement.
- It sought either to reintroduce tariff protection for British industry and agriculture
- Or it tried to institute retaliatory trade policies aimed at mitigating foreign protectionism.

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Introduction(3)

- Two major political parties are sharply divided over the course of Britain's commercial policy
- The Conservatives advocating tariff reform and the Liberals supporting free trade
- The trade policy was the main issue of 1906 general election.

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Introduction (4)

- In 1906 general election, voters chose the liberal party.
- British determined to go with free trade and the free trade regime continued until the WWI.

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Objective

- Irwin studied the voting pattern in each district.
- The hypothesis is that support for or opposition to free trade in each parliamentary district is closely related to the economic interests of the district's constituents.

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History

- In 1815, after Napoleon war, the Corn law was established.
- 1839, anti-Corn law league was established.
- In 1846, the Corn law was repealed.
- Free trade had a wide support in 1850s and 1860s.
- However, the situation started to change 1870s

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History (2)

- A surge of cheap grain from America and Russia in the late 1870s finally exposed British farmers to more severe foreign competition.
- Foreign competition, arising principally from Germany and the US, helped to shrink Britain's share of world trade in manufactures from roughly 46 % in 1870 to 29 % 1905.

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History (3)

- The share of manufactured goods in Britain's imports rising from 12.5 percent in 1860 to 21.3 percent in 1890 and to 25.4 percent in 1905.
- Traditionally, the Conservative party support fair trade (protectionism)
- Liberal party support free trade.
- In 1906 general election, trade policy was main issue.

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Empirical study

- Irwin look at the probability of liberal party's vote over the conservative party's vote in each election district.

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Characteristics of industires in 1907 UK

SECTORAL PERFORMANCE IN INTERNATIONAL TRADE: SELECTED INDICATORS, 1907 (Output and Trade Balance in Millions £)

	Output	Export Ratio	Import Ratio	Trade Balance
Agriculture	150.8	.03	.55	−173.77
Coal	122.6	.34	.00	42.10
Iron and steel manufactures	104.9	.44	.07	39.45
Engineering	61.2	.52	.09	26.45
Ships and boats	42.6	.24	.00	10.00
Cycles and coaches	21.4	.36	.23	2.86
Wood	46.4	.03	.04	−.52
Scientific instruments and cutlery	13.3	.48	.31	2.36
Earthenware	15.4	.26	.26	.00
Chemicals	75.0	.23	.16	5.42
Leather	34.9	.19	.33	−4.93
Cotton manufactures	173.9	.63	.05	100.91
Woollen manufactures	74.0	.46	.15	23.37

SOURCE.—Output data are from Final Report on the First Census of Production of the United Kingdom (1907) (London: His Majesty's Stationery Office, 1912); Parliamentary Papers, House of Commons, vol. 109; trade data are in Annual Abstract of Statistics 1907 (London: His Majesty's Stationery Office, 1908).

NOTE.—Export ratio = exports/production; Import Ratio = imports/consumption = imports/(production − exports + imports).

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Estimated equation

$$\log \frac{p_i}{(1-p_i)} = \alpha + \sum_{j=1}^{n} \beta_j X_{ji} + \gamma \mathrm{DUM}_i + \epsilon_i,$$

- P_i is the share of liberal party's vote. Xij are independent variable.
- Dum is the dummy variable indicating past voting behavior.

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Result

ECONOMETRIC RESULTS—ENGLAND, AND ENGLAND AND WALES
Dependent Variable: Log of the Odds Ratio

INDEPENDENT VARIABLES	ENGLAND (1)	ENGLAND (2)	ENGLAND (3)	ENGLAND (4)	ENGLAND (5)	ENGLAND AND WALES (6)	CONTRIBUTIONS (in Percent) To Col. 1	To Col. 2
Constant	.16	.16	.17	.29	.16	.09	3.9	2.2
	(1.15)	(1.14)	(1.18)	(.72)	(.85)	(.61)		
Agriculture	−.58	−.47	−.60	−.62	−.79	−.47	−1.4	−1.2
	(1.70)	(1.37)	(1.72)	(1.72)	(1.39)	(1.20)		
Coal mining	.44	.78	.54	.44	.53	1.63	.4	1.4
	(1.43)	(2.18)	(1.44)	(.98)	(1.31)	(3.50)		
Iron and steel	4.10	3.00	4.17	4.02	4.10	1.27	.8	.3
	(1.82)	(1.36)	(1.83)	(1.77)	(1.81)	(.49)		
Tools, dies, and arms	−4.30	−3.89	−4.30	−4.38	−4.30	−2.48	−1.9	−1.1
	(3.91)	(3.54)	(3.89)	(3.87)	(3.89)	(2.04)		
Engineering and machine making	3.02	3.50	3.02	2.86	3.02	2.64	4.4	3.6
	(4.20)	(5.11)	(4.10)	(3.33)	(3.95)	(3.10)		

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Ship building	2.07	1.86	2.03	2.09	2.07	1.93	.5	.4
	(1.83)	(1.62)	(1.77)	(1.83)	(1.78)	(1.48)		
Scientific instruments and cutlery	−8.49	−9.36	−8.63	−8.85	−8.48	−10.39	−2.0	−1.8
	(2.34)	(2.55)	(2.34)	(2.32)	(2.17)	(2.48)		
Chemicals	8.15	6.70	8.25	8.00	8.16	6.09	1.5	1.3
	(2.38)	(1.98)	(2.39)	(2.31)	(2.31)	(1.54)		
Cotton manufacturing	−.57	−.75	−.60	−.68	−.58	−.54	−.3	−.2
	(1.28)	(1.69)	(1.31)	(1.25)	(1.24)	(1.04)		
Woollen manufacturing	1.91	2.10	1.89	1.71	1.91	1.79	.3	.3
	(2.13)	(2.32)	(2.09)	(1.59)	(2.09)	(1.72)		
Crafts	1.13	1.36	1.11	1.01	1.13	1.37	1.4	1.7
	(2.03)	(2.47)	(1.98)	(1.54)	(2.00)	(2.13)		
Laborers (dock workers)	−2.68	−2.69	−2.75	−2.81	−2.69	−1.18	−3.0	−1.3
	(2.33)	(2.30)	(2.35)	(2.32)	(2.31)	(.92)		
Other*	...	...	−.35	−.59	−.01	...	...	...
			(.31)	(.35)	(.01)			
1900 election dummy	.09	...	.09	.10	.10	.12	51.0	50.1
	(1.96)		(1.89)	(1.97)	(1.93)	(2.11)		
R^2	.63	.61	.63	.63	.63	.54	...	...
$\bar{R}^2$	.58	.57	.58	.58	.58	.49	...	...
F	13.13	13.53	12.09	12.10	12.07	10.31	...	...

NOTE.—t-statistics are in parentheses.
* Other: in column 3: earthenware, porcelain, and glass manufacture; in column 4: retired and unoccupied; in column 5: merchants, agents, and so on.

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Interpretation of the results

- A district that has a high ratio of the agricultural sector did not vote for the liberal party. This is consistent with the theory.
- A district that has a high share of scientific instrument did not vote for the liberal party. This is consistent with the fact that the scientific industry has severe competition with US and Germany.

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- A district that has a high share of Iron , Steel and coal supported the liberal party.
- Those industry were exporting sectors at 1905.
- Overall, the results are consistent with the theory.

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Natural Experiment at the end of Edo period

- In the field of the social science, it is very difficult to conduct an experiment as in the biology or chemistry since the target is the society instead of insect or chemical.
- However, sometime, in history, things similar to the experiments happen due to a change of policy or natural disaster.

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Background

- Japan's policy of autarky (or seclusion) began formally in 1639 when all contact between the Japanese and outsiders, including trade,
- Treaty negotiations following the visit of Commodore Perry and his fleet in 1853 delayed the opening up of Japan until July, 1859.

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Background (2)

- By the mid-1860s, military intervention by the western powers had forced the Shogun to abandon rearguard efforts to restrict trade
- Long autarky and sudden opening for itnernational trade will provide a good "natural experiment " for trade theory.

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Background (3)

- First, as soon as the Edo government opened for trade, the amount of both import and export increased.

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Export and Import at the end of Edo Period

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Hypothesis

- Trade theory predicts that a sector that expreinced an increase of export will expreince the price increase and a good that experiences an increase of import will experience the decrease of the price.
- Here is the data

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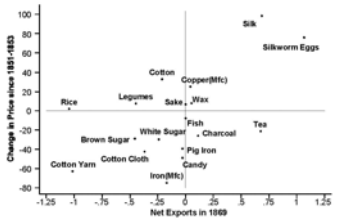
From Daniel M. Bernhofen and John C. Brown (2000)

Figure 4: Net Exports and Price Changes for 1869



Source: Japan Bureau of Revenue (1893) for trade data and Nakai (1989), Miyamoto(1963), Ono (1979), Kinyu Kenkyukai (1937), and Yamazaki (1983) for price data.

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Treffler's Puzzle

- Heckscher-Ohlin model say that a country that is rich in labor endowment should export labor intensive good and a country that is rich in capital should export capital intensive good.
- In other words, trade embodies factor content.
- This implies that many developed countries should import labor intensive good from labor rich countries if H-O theory is trude.

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Trefler's Puzzle (2)

- However, the real volume of trade is no so big as the theory predict.
- This is called " a missing trade puzzle".
- One potential explanation of this missing trade puzzle is the difference of the technologies.
- H-O theory predicts that the technology level is the same. But in reality it is no.

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Why sometimes H-O model not successful?

- NTB
- Regulation across countries
- Borders seem to matter
- Transportation cost and distance matters
- Property right and court system seems to matter

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General conclusions

- None of the above explanation does not seem to deny the H-O model
- Rather, the above explanation requires more complicated H-O model.
- As the model to explain the basic force of international trade, H-O model is very useful.

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